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Kenichiro Suzuki

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7590

06/03/2004

YOUNG & THOMPSON

745 SOUTH 23RD STREET 2ND FLOOR

ARLINGTON, VA 22202

EXAMINER

KLAUS, LISA NHUNG

ART UNIT

PAPER NUMBER

2832

DATE MAILED: 06/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|--|---|---|--|
| <p align="center">Office Action Summary</p> | <p>Application No.</p> <p>09/869,107</p> | <p>Applicant(s)</p> <p>SUZUKI ET AL.</p> | |
| | <p>Examiner</p> <p>Lisa N. Klaus</p> | <p>Art Unit</p> <p>2832</p> | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 June 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 70-209 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 100-209 is/are allowed.
- 6) ☒ Claim(s) 70, 71, 73-75, 77-79, 82, 84, 88-94, 99 and 169 is/are rejected.
- 7) ☐ Claim(s) 72, 80, 81, 83, 85, 86, 95-98 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 December 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>9/24/01</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a) because they fail to show "the line A-A" in FIG. 2A (page 27, line 18); "the single cantilever 55" (page 27, line 29) as described in the specification. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

2. The disclosure is objected to because of the following informalities:

The drawings 18 and 19 are not described in the specification. Appropriate correction is required.

Claim Objections

Claim 172 is objected to because of the following informalities:

- Regarding claim 172, page 32, lines 6 and 7, delete the space between "micro-" to "machine". Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 73-75, 78 and 99 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

- Regarding claims 73 and 74, "said electrical conductors" lacks antecedent basis.

- Regarding claim 78, "said electrical insulator" lacks antecedent basis.
- Regarding claim 99, applicant should clarify the phrase "a super-lattice structure".

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 70, 71, 79, 82, 91 and 168 are rejected under 35 U.S.C.102(b) as being anticipated by Loo et al. (US 6,046,659).

Loo discloses a micromachined switch comprising:

70- a supporter 32 formed on said substrate 14 and having a predetermined height relative a surface of said substrate 14;

- a flexible beam 16 projecting from said supporter 32 in parallel with a surface of said substrate 14 and having a distal end facing a gap;

- a contact electrode 24 formed on a surface of said beam 16 facing the substrate such that said contact electrode faces facing said gap;

- a lower electrode 22 formed on said substrate 14 in facing relation with a part of said beam 8; and an intermediate electrode 28 (fig. 7A) formed on said beam 16 in facing relation with said lower electrode 22;

71- the supporter and at least a part of the beam are composed of the same electrically conductive material and are formed integrally with each other;

79- the supporter has a floating potential;

82- wherein the lower electrode 22 is formed on the substrate 14 between the supporter 32 and the gap;

91- the intermediate electrode is electrically connected to the upper electrode.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 87-90, 92 are rejected under 35 U.S.C. 103(a) as being unpatentable over Loo in view of Seki (US 6,486,425).

6. Regarding claim 88, 92-94 Loo discloses the invention as claimed except for the contact electrode is covered with an insulating film.

Seki discloses an electrostatic microrelay comprising:

88- the contact electrode 12 is covered with an insulating film 15.

92- the lower electrode is comprised of a plurality of electrodes each having the same area by which each of the electrodes faces the upper electrode;

93, 94- the upper electrode is comprises of a plurality of electrodes each having the same area by which each of the electrodes faces the lower electrode;

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the contact electrode is covered with an insulating film as taught by Seki with Loo's switch for the purpose of increasing a large electrostatic attraction contact force.

Regarding claim 87, It would have been obvious to one of ordinary skill in the art at the time the invention was made to choose a thickness of the intermediate electrode is smaller than

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a thickness of the contact electrode to meet the specific use of the micro-switch, since such a modification would have involved a mere change in the size of a component. A change in size is generally recognized as being within the level of ordinary skill in the art. *In re Rose*, 105 USPQ 237 (CCPA 1955).

7. Regarding claims 89, 90 Loo and Seki do not disclose a substrate is one of a glass substrate and a ceramic substrate;

Loo discloses the substrate includes a ceramic material or gallium-arsenide (co. 4, lines 33-48);

Seki disclose a substrate is includes a glass material 11a;

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the glass substrate as taught by Seki with Loo's device for the purpose of reducing the cost and complexity of circuits, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

Allowable Subject Matter

8. Claims 72, 80, 81, 83, 85, 86, 95-98 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

9. Claim 74-77, 78, 84 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

10. Claims 100-209 are allowed.

The following is an examiner's statement of reasons for allowance:

The Prior Art fails to show the micro-machine switch comprising:

- Claims 72, 83 and 85: the beam is comprised of an electrical conductor extending from the supporter and having such a length that the electrical conductor faces the lower electrode, and electrical insulator extending from a distal end of the electrical conductor and the contact electrode being formed on the electrical insulator in facing relation with the gap.
- Claim 74-77 and 84: the beam further includes an upper electrode formed integrally with the electrical conductor on the electrical insulator.
- Claim 78: the upper electrode has a greater thickness than a thickness of the electrical insulator.
- Claim 80: at least one second supporter formed on the substrate, and having a predetermined height relative to a surface of the substrate and connected to the beam through at least one arm projecting from the second supporter in parallel with a surface of the substrate;
- Claim 86: wherein a surface of the supporter and a surface of the beam form an obtuse angle.
- Claim 96: the upper and lower electrodes comprised of the plurality of the electrodes define a comb-shaped electrode.
- Claim 97: the supporter and the beam are covered at their surfaces with an insulating film.
- Claim 98: the thickness of the insulating film on an upper surface of the beam is equal to a thickness of the insulating film on a lower surface of the beam.
- Claims 100-171: the micro-machine switch electrically connecting a first signal line formed on a substrate to a second signal line or electrically disconnecting the first signal line from the second signal line, the second signal line being formed on the substrate and having an end spaced away from an end of the first signal line by a certain gap comprising: an electrical

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insulator making contact with a lower surface of the beam and extending from the beam in a direction in which the beam extends, a contact electrode formed on a surface of the electrical insulator facing the substrate such that the contact electrode faces the gap; the reinforcement formed on the electrical insulator at a side opposite to the contact electrode in alignment with the contact electrode.

- Claims 172-175: a phased-array antenna comprising the phase-shifters includes a micro-machine switch for each of bits; each of data latching circuits is electrically connected to the micro-machine switch of the associated phase-shifter; the controller calculates with N-bit accuracy a degree of phase-shifting optimal for directing a radiated beam towards a desired direction, based on predetermined location and frequency of the antenna, and transmits the calculation result to each of the data latching circuits through the data distributing circuit, each of the phase-shifters applies a drive voltage to a micro-switch associated with a bit required by each of the phase-shifters, determines a degree of phase-shifting of each of the phase-shifters, alters a phase of a radio-frequency signal in accordance with the thus determine degree of phase-shifting, and supplies electric power to each of antennas; (claims 73, 74, 75) an electrical insulator making contact with a lower surface of said beam, and extending from the beam in a direction in which the beam extends, a contact electrode formed on a surface of the electrical insulator facing the substrate such that the contact electrode faces the gap;

- Claim 176-192, 200-204: a method of fabricating a micro-machine switch comprising the steps of forming the third electrode and a pair of signal lines on a second substrate; etching a substrate at areas except a first area to thereby turn the first area into a raised portion; forming a first and second electrodes on the electrical insulator above the second area; adhering an upper surface of the first area of the substrate onto the second substrate such that the first electrode faces the pair of signal lines and the second electrode faces the third

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electrodes; removing areas of the substrate except area into which impurities have been diffused; (claim 200) filling the recess with an electrical insulator.

- Claims 193-199 and 205-209: a method of fabricating a micro-machine switch comprising the steps of forming a fifth electrode and a pair of signal lines on a second substrate; adhering upper surface of the first and second areas of the substrate onto the second substrate such that the first electrode faces the pair of signal lines, the second electrode faces the fourth electrode and the third electrode faces the fifth electrode; forming an electrical insulator extending across the third and fifth areas on the substrate, forming the first electrode on the electrical insulator above the third area, forming a second electrode on the electrical insulator above a fourth area and further forming a third electrode on the electrical insulator above the fifth area.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion


11. Any inquiry concerning this communication should be directed to Lisa Nhung Klaus whose telephone number is (571)272-1993, and whose fax number is 703-872-9306. In the event that I am not reached, you can contact my supervisor, Mr. Elvin G. Enad at (571)272-1990 or the tech center receptionist at (703) 308-1782.

LK

Lisa Nhung Klaus

Patent Examiner - Art Unit 2832

May 13, 2004


ELVIN ENAD
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

5/31/04